

5.6 AIR AND NOISE

5.6.1 AIR QUALITY AND CLIMATE

5.6.1.1 Context

ANV Technology were commissioned by McGill Planning to undertake an air quality and climate impact assessment for the proposed Bray Flood Defence Scheme. This report presents the results of the assessment together with details of the methodologies employed.

The format of the report is as follows:

- A description of the **Methodology** used.
- A description of the aspects of the **Existing Air Quality Environment**
- The establishment of **Assessment Criteria**
- An assessment and description of the **Impacts** of the proposed scheme on the air quality environment.
- Recommendations for **Mitigation** measures to reduce or eliminate any significant negative impacts identified.
- An assessment of the **Residual Impact** which will remain assuming that the recommended mitigation measures are fully and successfully implemented.

Air Quality impacts will be of limited duration and will only occur during the construction phase of the scheme.

The potential air quality impacts from this type of project are as follows:

- Generation of dust during excavation and construction works
- Airborne pollutants due to associated traffic
- Emissions of greenhouse gases associated with the proposed works

The impact on climate is considered in the context of the national climate change policy. As regards impact on microclimate, there are no special features of the environment at this site, or inherent properties of the proposed works, which would indicate a significant local climate impact.

This assessment is based on general information available at the planning stage of the project. The analysis presented is considered indicative of the scale of potential air quality impacts during the construction phase. It should be noted that the data presented does not constitute a definitive estimate of dust deposition levels. This detailed analysis can only be carried out when precise details of works are formulated in

terms of equipment, processes, and timings. This detailed analysis will be the responsibility of contacting companies undertaking the work, in accordance with the applicable standards.

5.6.1.2 Methodology

The air quality assessment consisted of the following elements:

- Evaluation of the existing air quality through a review of published EPA data
- Assessment of construction phase impact on air quality adjacent to the site, based on observations at similar construction sites
- Calculation of nitrogen oxide emissions from traffic associated with the completed development, based on the methodology of the UK "Design Manual for Road and Bridges"

5.6.1.2.1 Assessment Criteria

Assessment Criteria for Airborne Pollutants

The impact on air quality was assessed by comparison with the requirements of the Air Quality Standards Regulations 2002 (SI 271/02). These regulations assign limit values for the common pollutants associated with combustion. This report focuses on annual mean concentrations of nitrogen dioxide as the primary indicator pollutant.

The regulations specify limit values (as annual means and short-term averages) with a sliding implementation scale until the final limits apply in 2010. Limit values which will apply in 2010 are shown in Table 5.6.1.1. Exceedance of a limit value as a consequence of a development scheme is considered a significant adverse impact.

In assessing whether a change in pollutant concentration is of significance, reference is made to the published National Roads Authority (NRA) criteria "Guidelines for Treatment of Air Quality in National Road Schemes" NRA, 2006. While these criteria were developed for roads schemes they are also applicable to other development projects. The magnitude of the impacts due to a development is described using the criteria outlined in Table 5.6.1.2. The significance of an adverse impact, which takes account of the magnitude of the change and the levels in relation to the standards, are presented in Table 5.6.1.3.

Table 5.6.1.1

Limit values from air quality standards regulations SI 271/02. The annual limit values for the common pollutants are shown (and 8-hr limit value for CO). There are also short-term (hourly and daily) limit values specified in the regulations.

Pollutant	Limit Value 2010
Sulphur dioxide, SO ₂	20 µg/m ³
Nitrogen Dioxide, NO ₂	40 µg/m ³
Fine particulates PM ₁₀	20 µg/m ³
Lead, Pb	0.5 µg/m ³
Benzene C ₆ H ₆	5 µg/m ³
Carbon monoxide CO	10 mg/m ³

Criteria for dust deposition

The EPA has published guidelines ‘*Environmental Management in the Extractive Industries*’. This sets a guideline deposition limit of 350mg/m²/day at boundaries of quarries.

It is reasonable to apply the same criterion to the short term dust deposition at construction sites. In the case of this project the site boundary can be considered to be the nearest residence, the distance of which will vary.

Table 5.6.1.2

Qualitative description of the magnitude of changes

Annual Mean NO ₂	Magnitude of change
Increase/decrease > 25%	Very Large
Increase/decrease 15-25%	Large
Increase/decrease 10-15%	Medium
Increase/ decrease 5-10%	Small
Increase/decrease 1-5%	Very small
Increase/decrease <1%	Extremely small

Source: NRA Guidelines (2006)

Table 5.6.1.3

Air Quality Impact Significance Criteria

Absolute concentration in relation to Standard	Increase in Concentration due to Scheme					
	Extremely small <1%	Very small 1 – 5%	Small 5 - 10 %	Medium 10 – 15%	Large 15 – 25%	Very Large >25 %
Above Standard WS	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Above Standard DM, Below WS	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below Standard DM, but not well below	negligible	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
Well below standard DM	negligible	negligible	Slight adverse	Slight adverse	Slight adverse	Moderate adverse

Well below standard = < 75% of the air quality standard limit value.

DM: Do Minimum; WS: With Scheme, Source: NRA Guidelines (2006)

5.6.1.3 Description of Receiving Environment

The local air quality is influenced mainly by road traffic. There are no heavy industries in the immediate vicinity of the proposed site.

The existing air quality in the vicinity of the proposed development could reasonably be expected to be similar to values reported for Zone C areas which include urban areas outside of Dublin and Cork.

The Environmental Protection Agency (EPA), in conjunction with local authorities, is responsible for monitoring of national air quality standards.

The most recently published EPA report is for 2005: "Ambient Air Quality in Ireland 2005", published by the EPA in 2006. This report found that air quality in Zone C areas was within the air quality standards which currently apply. Measured values for PM₁₀ and NO₂ emissions obtained in 2005 show an improvement over previous years.

The mean concentration of NO₂ was 13µg/m³ (Range 9-18 µg/m³) during the 2005 measurement period. This concentration is comfortably below the annual limit value of 40µg/m³ assigned in the Air Quality Standards Regulations SI 271 of 2002.

The mean particulate matter (PM₁₀) was 18µg/m³ (Range 13-23µg/m³). Again, this is within the legislated limit of 20µg/m³ assigned for 2010.

For the pollutants sulphur dioxide, lead, benzene and carbon monoxide, the published data indicate that the annual limit values applicable in 2010 are comfortably complied with.

5.6.1.4 Potential Air Quality Impacts

Air quality impacts will be of limited duration and will only occur during the construction phase of the scheme. The potential air quality impacts will be negative in character. Hazardous chemical or biological agents are not likely to be present which could become airborne during the proposed works.

There will be no air quality issues associated with the completed scheme. Operational air quality impacts are not considered any further.

Dust Deposition

The main potential impact will be due to airborne dust, and dust deposition at nearby buildings.

For ordinary non-hazardous dust, the potential impact is in terms of its visual nuisance rather than health effects. The nuisance is associated with dust deposition on surfaces, cars, and windows of properties.

Due to the highly variable nature of dust generation from construction works there is limited benefit from predicting dust emissions by dispersion modelling. From experience at a range of construction sites, it is observed that the dust generally settles within the site itself, with little dust passing over the site boundaries.

For significant sections of the proposed works, the potential airborne dust content is in the form of the small clay/silt fraction. These are particles of size less than 0.06mm. However due to the natural moisture content, this material has no potential for becoming airborne during the excavation phase, or during the subsequent wet processing phases.

Stockpiles of silt do not pose a threat for airborne dust, as a hard sealing crust forms. There would be minor local dust generation in periods of dry weather when the silt is loaded for transport from the site.

Many of the dust issues associated with construction works are due more to material deposited on the haul routes, than dust generation from the site itself. Mud can be deposited on roads for several hundred metres from a site by vehicles serving the site. In dry weather, this gives rise to fine dust, which may be re-suspended by passing traffic, and can result in soiling of properties along the haul route.

Construction Vehicles

Combustion air pollutants are generated from construction vehicles and plant. The impact from construction vehicle emissions is estimated based on a nominal 10 truck movements per hour, which may be representative of likely vehicle movements.

This would result in an increase in the annual mean concentration of approximately 0.7 $\mu\text{g}/\text{m}^3$ NO_2 and 0.1 $\mu\text{g}/\text{m}^3$ PM_{10} at a reference distance of 10m from the haul routes to the site. This represents a very small change in pollutant concentrations for the duration of the works. The predicted impact from construction vehicles can be considered negligible.

Climate

There are no special features of the environment at this site, or inherent properties of the proposed development, which would indicate potential for any local climatic effects.

A development of this class and scale has no inherent capacity for influencing climate on a local, regional or significant global scale.

Greenhouse gases are radiatively active gases, which give rise to an increase in global temperatures. The dominant greenhouse gases in Ireland are carbon dioxide, CO_2 , arising from the burning of fossil fuel, and methane from agricultural sources. This proposed scheme will generate low level CO_2 emissions due to construction machinery and associated road traffic for the duration of the works. These emissions are short-term, and insignificant in the context of other existing greenhouse gas emissions in the locality.

5.6.1.4.1 Geographical Extent of Air Quality Impacts

The potential air quality impacts of the proposed works will occur within 50m of the proposed works and within approximately 20m of proposed haul routes. There are in the order of 80 residential dwellings within 50m of proposed works.

5.6.1.4.2 Magnitude of Air Quality Impacts

Dust deposition at the nearest properties is expected to be very comfortably within the guideline limit value of 350 $\text{mg}/\text{m}^2/\text{day}$. A dust deposition rate of less than 100 $\text{mg}/\text{m}^2/\text{day}$ could reasonably be expected. This is based on previous experience of dust deposition measurements taken at a range of quarry and construction site boundaries.

5.6.1.4.3 Duration, Frequency and Reversibility of Impacts

Due to the nature of the proposed works all air quality impacts will be of limited duration. Works would be anticipated to be in progress adjacent a given residence for the order of a week. All potential air quality impacts can be termed short term.

The air quality impacts are reversible and will cease once works are completed.

5.6.1.4.4 Consequence of Air Quality Impacts

The main consequence of the potential air quality impacts arise from dust deposition at nearby residences. This dust may arise from dust generation associated with the proposed construction works and from material deposited on the haul routes. For ordinary non-hazardous dust, the potential impact is in terms of its visual nuisance rather than health effects.

5.6.1.4.5 Significance of Air Quality Impacts

Air quality impacts are predicted to be negligible providing good management practices are followed.

5.6.1.4.6 Probability of Air Quality Impacts

The predicted air quality impacts are possible in all cases.

5.6.1.5 Mitigation Measures

It should be verified that there is no potential for contaminated soil before excavation commences.

Soiling of roads can be minimised by use of truck wheel washes at the four proposed site compounds, covering of trucks carrying fine materials and surfacing of the site exit roads. A road cleaning service at critical times will also be beneficial.

Active management is required to monitor and minimise the generation of dust. During dry periods, water sprays may be required. Any temporary stockpiling of soil should be designed to minimise exposure to wind.

At this planning stage it is not possible to determine the timings of the air quality impacts. This is due to the nature of dust generation. As stated, active management will be required by the contractor. More detail on the mitigation measures will be provided at the detailed design stage.

5.6.1.6 Residual Impact**Dust Deposition**

With good management and controls, dust deposition rates at the nearest sensitive properties could reasonably be expected to be less than 100mg/m²/day, at which level there would be little noticeable effect.

If effective mitigation measures are implemented both on the site and along the haul routes, dust deposition will be minimised. There may be a residual minor adverse impact at properties fronting the haul routes adjacent to the site access points. This impact is short term in nature.

Construction Vehicles

The predicted increase of 0.7 µg/m³ NO₂ and 0.1 µg/m³ PM₁₀ at a reference distance of 20m from the haul routes to the site is not significant, and is of limited duration.

Climate

There will be a negligible residual impact on climate.

5.6.1.7 The Do Nothing Scenario

There will be neither a positive or negative impact on air quality under the do-nothing scenario.

5.6.1.8 The Worst Case Scenario

The potential air quality impacts have been considered based on a worst scenario.

5.6.1.9 Positive Impacts

There are no positive impacts in terms of air quality with the proposed scheme.

5.6.1.10 Reinstatement

Not applicable.

5.6.1.11 Monitoring

Monitoring is not likely to be necessary, where there is effective implementation of mitigation measures.

5.6.1.12 Summary

An assessment was undertaken of the impact on air quality and climate for the proposed Bray Flood Defence Scheme.

Based on the data published by the EPA, air quality is currently within applicable air quality standards.

Air quality impacts will be of limited duration and will only occur during the construction phase of the scheme.

There may be potential for slight dust nuisance in the immediate vicinity of the proposed works. The dust may be generated directly from construction works, or due to truck movements on the haul routes. Adequate dust control measures, such as wheel washes, road cleaning, covering of fine material, and effective management, will be required to ensure the impact is minimised.

Construction traffic may result in a slight short-term increase in concentration of vehicle combustion pollutants in the vicinity of the site. The impact on air quality is negligible.

There are no special features of the environment at this site, or inherent properties of the proposed scheme, which would indicate potential for any local climatic effects.

A development of this class and scale has no inherent capacity for influencing climate on a local, regional or significant global scale.

5.6.2 NOISE

5.6.2.1 Context

ANV Technology were commissioned by McGill Planning to undertake a noise and vibration impact assessment for the proposed Bray Flood Defence Scheme. This report presents the results of the assessment together with details of the methodologies employed.

The format of the report is as follows:

- A description of the **Methodology** used.
- A description of the aspects of the **Existing Noise Environment**
- The establishment of **Noise Assessment Criteria**
- An assessment and description of the **Impacts** of the proposed scheme on the noise environment.
- Recommendations for **Noise Mitigation** measures to reduce or eliminate any significant negative impacts identified.
- An assessment of the **Residual Impact** which will remain assuming that the recommended mitigation measures are fully and successfully implemented.

The proposed flood defence scheme will involve extensive works along the banks of the River Dargle as it passes through Bray Town. Noise and vibration impacts will be of limited duration and will only occur during the construction phase of the scheme when there will be a number of potentially significant sources of noise such as rock breaking, pile driving, water pumping, excavations and associated traffic and general construction noise. There will be no noise and vibration issues associated with the completed works.

This assessment is based on general information available at the planning stage of the project. The analysis presented is considered indicative of the scale of potential noise impacts during the construction phase. It should be noted that the data presented does not constitute a definitive estimate of noise levels. This detailed analysis can only be carried out when precise details of works are formulated in terms of equipment, processes, and timings. This detailed analysis will be the responsibility of contacting companies undertaking the work, in accordance with the applicable standards.

5.6.2.2 Methodology

The methodology used for this assessment is outlined as follows:

- The existing ambient noise levels were measured at representative reference positions, in accordance with ISO 1996 "Description and measurement of environmental noise".
- Construction noise was calculated with reference to typical construction noise data in BS 5228 "Noise Control on Construction and Open Sites", and assessed according to Irish National Roads Authority construction noise criteria

- The potential impact of ground vibration levels was evaluated based on experience at similar sites, with reference to BS 7385 "Evaluation and measurement of vibration in buildings" and BS 6472 "Guide to evaluation of human exposure to vibration in buildings".

5.6.2.3 Description of the Receiving Environment

The main source contributing to the local ambient noise environment is traffic noise. The existing noise environment was determined by noise surveys at a number of residential areas adjacent to the sites of the proposed works.

Noise Survey Details

Noise surveys were carried out on the 16th and 17th of May 2006 by ANV Technology Ltd. The details of the noise survey are given in Appendix F2 of this EIS.

Noise Measurement Locations

Seapoint Court – Houses are situated on the south side of the river Dargle between chainage 3300 and 3450. The proposed engineering works are approximately 5m from the façade of the nearest dwelling.

The Maltings – This housing estate is situated on the south side of the River Dargle above Bray Bridge between chainage 2460 and 3010. The proposed engineering works are approximately 2.5m from the façade of the nearest dwelling. Noise measurements were taken adjacent to house number 37.

St Bridget's Terrace – Houses are situated along the Lower Dargle Road. Noise measurements were made opposite House number 11. The proposed engineering works are approximately 10m from the nearest dwelling.

Coburg – Houses are situated on the north side of the river Dargle between chainage 2010 and 2210. The proposed engineering works are approximately 5m from the façade of the nearest dwelling. Noise measurements were taken opposite house number 10.

Killarney Glen – Houses are situated on the south side of the river between chainage ch1860 and ch2010. The proposed engineering works are approximately 5m from the façade of the nearest dwelling. Noise measurements were taken approximately 30m from the front of house number 1.

Instrumentation

The noise measurements were recorded using a CEL 420 sound level meter, calibrated using a Bruel & Kjaer 4231 calibrator. The instrument was calibrated immediately before and after the surveys.

Weather

16th May 2006 – Dry with a light breeze

17th May – 09.00-11.00: Overcast with light to moderate breeze. Heavy rain from 12.00 onwards.

Measurement parameters

Noise levels are measured using a logarithmic noise scale (decibel) and are denoted dB(A). The "A" indicates that a frequency weighting has been applied to allow for the variation in the sensitivity of the human ear as a function of frequency. The duration of the measurement at each location was a minimum of 15 minutes and the measurement parameters are as follows:

- L_{Aeq}** the average noise level during the measurement period, which includes all noise events. The L_{Aeq} value has been found to correlate well with human tolerance of noise.
- L_{A90}** the noise level exceeded for 90% of the time. It is generally taken as being representative of the steady background noise at a location. It tends to exclude short events such as cars passing, dogs barking, aircraft flyovers etc.
- L_{A10}** the noise level exceeded for 10% of the time. It is a measure of the higher noise levels present in the ambient noise. The L_{A10} parameter is commonly used to describe traffic noise.

Noise Surveys Results

The results of the noise survey are summarised in Table 5.6.2.1, which shows the mean measured total noise level, L_{Aeq}, and mean background noise level, L_{A90}, at each house location. The total noise is the noise due to all noise sources present, such as: local and distant traffic, voices, animals, and other local noises. The “background noise” represents the steady component of the noise, which is mainly distant traffic noise in this case. Detailed survey results are given in Appendix F2 of this EIS.

Table 5.6.2.1.
Summary of results of noise surveys

Location	Mean measured noise levels			Comments
	L _{Aeq,15mins}	L _{A90}	L _{A10}	
Seapoint Court	48	42	50	Distant traffic and intermittent train noise
The Maltings	50	45	56	Distant traffic noise
St. Bridgids Terrace	61	47	64	Intermittent local and distant traffic noise
Coburg	52	48	55	Traffic from the Dargle Road and distant traffic noise
Killarney Glen	50	47	52	Distant traffic noise, wind blowing trees

Existing Daytime Noise Environment

The noise environment is determined primarily by local traffic from the Upper Dargle Road, Lower Dargle Road, Castle Street, and Quinsborough Road. Distant traffic from the nearby N11 contributes to the underlying steady background noise. There are no significant industrial noise sources in the vicinity of the proposed scheme contributing to the existing noise environment at the nearest noise sensitive locations.

5.6.2.4 Potential Noise Impacts

Noise impacts will be of limited duration and will only occur during the construction phase of the scheme when there will be a number of potentially significant sources of noise. The potential noise impacts will be negative in character.

There will be no noise and vibration issues associated with the completed scheme. Operational noise impacts are not considered any further.

5.6.2.4.1 Noise and Vibration Impact Assessment Criteria

There are no mandatory noise limits for construction noise in Ireland or in the UK. Criteria for daytime construction noise are often set at a level higher than for other permanent intrusive noise sources because it is recognised that it is a short-term activity. In setting criteria for construction noise, account has to be taken of the technical feasibility of the proposed criterion, and also the trade-off between the noise level, and the duration of the noise exposure.

For prolonged exposures significantly above 70 dB(A), the level of noise intrusion into houses may however prove unacceptable. An average level of 70 dB(A) L_{Aeq,1hr}, with a short-duration noise maximum of 80 dB(A) L_{Amax} are the daytime construction noise limits proposed in the National Roads Authority guidelines for road construction projects, as shown in Table 5.6.2.2 (“Guidelines for the Treatment of Noise and Vibration in National Roads Schemes”, 2004).

The short-term limit refers to the highest instantaneous sound level. For typical construction works, compliance with the average noise level of 70 dB(A) L_{Aeq} , would also generally imply compliance with the short-term maximum limit of 80 dB(A). The exception would be noise of a significant impact nature such as piling, or rockbreaking.

These construction noise limits represent a reasonable compromise between the practical limitations in a construction project, and the need to ensure an acceptable ambient noise level for the residents. Exceedence of these limits represents an adverse impact. The scale of adverse impact depends on the degree of exceedence, and the duration of the construction noise. The descriptive scale of adverse impacts used in this report is as follows:

Negligible: construction noise level is within 70 dB(A) limit, and the duration of project is the order of days

Slight: construction noise level is in range 70 – 75 dB(A), and the duration of the project is the order of days, or noise level is in range 60-70 dB(A), and the duration of the project is the order of weeks

Moderate: construction noise level is in range 75 – 80 dB(A), and the duration of the project is the order of days, or noise level is in range 70-75 dB(A), and the duration of the project is the order of weeks, or noise level is in range 60-70dB(A), and the duration of the project is the order of months.

Significant: construction noise level exceeds 80 dB(A), and the duration of the project is the order of days, or noise level is in range 75-80 dB(A), and the duration of the project is the order of weeks, or noise level is in range 70-75dB(A), and the duration of the project is the order of months.

Severe: construction noise level exceeds 80 dB(A), and the duration of the project is the order of weeks/months, or noise level is in range 75-80 dB(A), and the duration of the project is the order of months.

The National Road Authority guidelines for road construction projects do not include limits for works between the hours of 22:00 hours and 07:00 hours. However for such night-time works it would be reasonable to assign a limit of 45 dB(A) $L_{Aeq,1hr}$, which is the EPA guideline industrial noise limit.

Regarding vibration impacts, exceedence of the guideline limits for protection against cosmetic structural damage is considered a significant impact. For continuous ground vibration generated by piling, exceedence of the 2.5mm/s guideline limit is considered a significant impact, in terms of vibration annoyance.

Table 5.6.2.2
Maximum permissible construction noise levels at the façade of dwellings
(NRA October 2004).

Days & Times	Time-Averaged $L_{Aeq(1hr)}$ dB	Short-Duration Maximum L_{Amax} dB
Monday to Friday 07.00 to 19.00	70	80
Monday to Friday 19.00 to 22.00	60	65
Saturday 08.00 to 16.30	65	75
Sundays and Bank Holidays 08.00 to 16.30	60	65
Vibration Limits: For protection of buildings 8 mm/s (vibration frequency <10Hz) 12.5mm/s (vibration frequency 10 to 50Hz) 20 mm/s (vibration frequency >50 Hz) Continuous piling: 2.5mm/s (tolerable level)		

$L_{Aeq(1hr)}$ is the one hour average noise level.

L_{Amax} is the measured maximum noise level.

Traffic Noise Assessment Criteria

The impact of the additional traffic noise associated with the proposed works was assessed by considering the change in noise level, due to the associated construction vehicle movements.

An overview of the significance of traffic noise levels, and the subjective perception of changes in traffic noise levels, is provided Table 5.6.2.3. Changes in traffic noise level of less than 2 dB are considered to have negligible impact, as this degree of change is not perceptible to the human ear.

Table 5.6.2.3**Subjective response to changes in noise level, and description of typical noise levels**

Change in Noise Level	Subjective Perceived Change	%Change in Loudness
0 dB	No change	0%
1 to 2 dB	Negligible change	10%
3 to 5 dB	Noticeable change	30%
6 to 9 dB	Clearly noticeable	70%
>10 dB	Substantial change	>100% (more than twice as loud)
Level	Description of Traffic Noise	
<45 dB(A)	Very low traffic noise	
45-50 dB(A)	low level, quiet residential area	
50 - 60 dB(A):	low to moderate – audible but not intrusive indoors	
60-65 dB(A):	moderate level, clearly audible, slightly intrusive	
>65 dB(A):	loud traffic noise – typical busy town centre	
>75 dB(A)	very loud – close to roadside with fast traffic	

5.6.2.4.2 Geographical Extent of Noise Impacts

The potential noise impact of the proposed works will occur within 70m of the proposed works. Noise levels at greater distances are predicted to be less than the daytime construction noise limit of 70 dB(A) and the adverse impact will be negligible to slight beyond this distance.

5.6.2.4.3 Magnitude of Noise Impacts

The project will involve extensive construction works with associated potential negative noise impacts. These works include the upgrading of the river channel, construction of embankments, construction of retaining walls and most significantly sheet piling.

The expected construction noise levels at the houses adjacent to the proposed works were calculated in accordance with BS 5228. The calculations are based on typical equipment noise emissions data (for sheet piling, excavating and rock breaking) and allow for distance attenuation, and marginal screening at the house boundaries.

The noise level at the noise sensitive locations will vary depending on the type of works being undertaken and the proximity of these works. Table 5.6.2.4 shows the calculated noise levels for houses at various distances from the works. Extensive construction may not be required in all areas, such as in areas requiring improvements to the existing river wall. Other areas will require extensive work involving the installation of sheet piles.

Table 5.6.2.4

Calculated noise levels at houses for the range of anticipated construction activities. Potential exceedence of the 70 dB(A) criterion is indicated by shading.

Activity	Sound Power	Distance of Noise Sensitive Location from Works (metres)					
		10	20	30	40	50	100
	L _{WA}	Noise level dB(A) L _{Aeq,1hr}					
Precast Concrete Sheet Piling	124 dB(A)	87	81	77	75	73	67
Bored Piling	116 dB(A)	79	73	69	67	65	59
Tracked Excavation	112 dB(A)	75	69	65	63	61	55
Pumping Water	109 dB(A)	72	66	62	60	58	52
Scraper removing earth	118 dB(A)	81	75	71	69	67	61
Road Construction	118 dB(A)	81	75	71	69	67	61
Transport of Material	110 dB(A)	73	67	63	61	59	53

Note: based on data from BS 5228, with 50% on-time and with assumed nominal screening allowance of 6 dB for boundary walls.

For sensitive locations within approximately 70m of precast concrete piling works, the noise impact is likely to exceed the construction noise limit of 70 dB(A). For sensitive locations immediately adjacent (within 30m) or opposite the location of the sheet piling, the noise impact is likely to substantially exceed the NRA guidelines. The impact would be termed significant for works of relatively short duration, the order of a few days, and potentially severe for works of prolonged duration, in the order of weeks. Mitigation would be required.

For sensitive locations within 30m of excavation works, the noise impact is likely to exceed the NRA guidelines. The impact is deemed to be slight to moderate as works are anticipated to be of relatively short duration. Mitigation would be required.

AREA I – Harbour Bridge to Bray Area

Sheetpiling to prevent water seepage and the construction of earthen embankment is proposed adjacent residences in the Seapoint Court Estate.

Noise levels due to the excavation and construction of earthen embankments are likely to exceed the 70 dB(A) construction noise limit at residences within 30m of the works.

Noise levels due to sheetpiling are likely to exceed the 70 dB(A) construction noise limit at residences within 70m of the works. Sheetpiling is proposed at a distance of 10m from a number of residences at the western side of the Seapoint Court Estate. Noise

levels from sheetpiling are predicted to be approximately 85dB(A) at these houses. This is likely to be a severe impact.

High frequency, low vibration sheetpiling is proposed adjacent residences on the Ravenswell Road. Noise levels at these residences are predicted to be approximately 75 dB(A) when piling is directly adjacent the houses. This is classified as a moderate impact if the duration of works directly adjacent the houses is likely to be in the order of weeks. Noise levels due to the construction of the proposed earthen embankments in the Golf Club lands may exceed the 70 dB(A) construction noise limit for a short time when construction activity is nearby. This is classified as a slight impact as it is likely that construction of the earthen embankments would only last a number of days directly adjacent the houses on Ravenswell Road.

Area 2 – Bray Bridge

It is proposed to construct a culvert under Castle Street to measure approximately 7.4m wide by 4m deep over a length of 80m. The culvert will be formed by constructing a secant pile wall on either side, and excavating the material in between. Precast concrete sections will then be lowered into place with a new road surface being laid over the culvert. Construction of the culvert is proposed at nighttime. In the event of these works occurring at nighttime the impact at residences up to distances of approximately 400m from the proposed works would be classified as severe.

Noise levels are predicted to be in excess of 70 dB(A) at the closest houses on Ravenswell Road during piling. Noise levels are predicted to be in excess of 65 dB(A) at the closest houses on Ravenswell Road during excavation..

Noise levels are predicted to be in excess of 60 dB(A) at the closest houses at the Maltings and on the Lower Dargle Road.

AREA 3 – People’s Park and The Maltings

Sheetpiling is proposed within 70m of residences in the Maltings and residences on the Lower Dargle Road. Noise levels due to sheetpiling are likely to exceed the 70 dB(A) construction noise limit at c. 136 residences within 70m of the works.

Sheetpiling is proposed immediately adjacent a number of residences at the eastern end of The Maltings. Sheetpiling noise may reach 90dB(A) for periods of activity when within 10m from the houses. Noise levels from sheetpiling are predicted to be approximately 80dB(A) at houses at the western end of the Maltings. This is classified as a severe impact.

Noise levels are predicted to be approximately 75dB(A) at residences opposite the secant pile construction on the Lower Dargle Road. This is classified as a significant impact if the duration of works is in the order of weeks and potentially severe if in the order of months.

AREA 4 – People’s Park to the Slang/Rehills Land

Sheetpiling is proposed adjacent to residences in the Coburg Estate, Killarney Glen and Glenwood. Noise levels due to sheetpiling are likely to exceed the 70 dB(A) construction noise limit at residences within 70m of the works.

Noise levels due to sheetpiling are predicted to be approximately 85dB(A) when sheetpiling is in progress adjacent residences at Coburg. This is classified as a severe impact.

Noise levels due to sheetpiling are predicted to be approximately 80dB(A) when sheetpiling is in progress adjacent to residences at Killarney Glen. This is classified as a significant impact as it is likely that the duration of works will be in the order of days directly adjacent the residences. If the duration of works were to be in the order of weeks then the impact would be classified as severe.

Noise levels due to sheetpiling are predicted to be approximately 75(A) when sheetpiling is in progress to the North of residences at the western end of Glenwood. This is classified as a moderate impact as it is likely that the duration of works will be in the order of days directly adjacent the residences. If the duration of works were to be in the order of weeks then the impact would be classified as significant.

Noise levels due to the excavation and construction of earthen embankments are not likely to exceed the 70 dB(A) construction noise limit at residences in Area 4. The impact is deemed negligible.

AREA 5 – La Vallee to NII Bridge

Noise levels due to the excavation of the river bank are unlikely to exceed the 70 dB(A) construction noise limit at the La Vallee Apartments. The impact is deemed negligible.

5.6.2.4.4 Construction Traffic

At this planning stage, precise details are not available on construction traffic volumes. Additional traffic noise can however be expected on haul routes to the proposed works.

Based on a nominal assumption of 10 heavy vehicles per hour travelling to/from the work sites, the additional traffic noise generated at a house at a reference distance of 10m from the road is expected to be approximately 55 dB(A) $L_{Aeq,1hr}$. This is a relatively low level of traffic noise in a suburban environment. Road traffic noise levels in suburban areas are typically in the range 55 to 65 dB(A) at 10 m from the roadside. The additional construction traffic noise would increase these levels by at most 1 to 3 dB. This would be a just noticeable change, and the impact would be negligible.

5.6.2.4.5 Vibration Impact

The NRA vibration limits for the protection of buildings against cosmetic damage are as follows:

Vibration Limits:

8 mm/s (vibration frequency <10Hz)

12.5mm/s (vibration frequency 10 to 50Hz)
20 mm/s (vibration frequency >50 Hz)

The National Roads Authority guidelines mention 2.5mm/s as the vibration level that may be considered tolerable due to piling.

Taking account of the nature of the likely works, such as excavation, sheet piling and rockbreaking, and typical data in BS 5228, it could be expected that the resulting vibration levels at nearby properties can be maintained within the vibration limits for protection against cosmetic structural damage, through use of low-vibration techniques, and standard mitigation measures.

However the generation and transmission of piling vibration will depend on ground conditions encountered, the exact method of piling, and is consequently difficult to predict. From data presented in BS 5228 however it is considered that the piling criterion of 2.5mm/s could potentially be exceeded for houses immediately adjacent to the site works. This would result in a significant vibration nuisance.

For locations in excess of 20m from the works, it could reasonably be expected that ground vibration could be maintained below the 2.5mm/s criterion. The vibration may still be perceptible, but in terms of nuisance would be tolerable. In such situations, the perceived noise nuisance would in general be greater than the associated vibration nuisance.

5.6.2.4.6 Duration, Frequency and Reversibility of Impacts

Due to the nature of the proposed works all noise impacts will be of limited duration and will only arise when high noise works are taking place nearby. The duration of sheet piling immediately adjacent a given residence is anticipated to be in the order of days. Excavation works would be anticipated to be in progress adjacent a given residence for the order of a week. All potential noise impacts can be termed short term.

The noise impacts are reversible and will cease once works are completed.

5.6.2.4.7 Consequence of Noise Impacts

The predicted noise impacts will cause varying degrees of disturbance to residents within the immediate vicinity of the proposed works. The degree of disturbance will depend on the type, duration and timing of the proposed works.

Special consideration must be taken when undertaking piling works near sensitive locations with predicted noise levels in excess of 80 dB(A) $L_{Aeq,1hr}$. Especially sensitive residents, such as the elderly and people convalescing should be given extra consideration as these high noise works may prove especially disturbing for these residents.

Any night-time works with predicted night-time noise levels in excess of 45 dB(A) $L_{Aeq,1hr}$ at residences will result in a significant to severe impact and would require detailed case by case consideration.

5.6.2.4.8 Significance of Noise Impacts

Table 5.6.2.5

Procedure for assessment of overall noise impact, taking account of the duration of construction noise levels

Approximate Duration of Exposure	Predicted Average Noise Level $L_{Aeq}(1hr)$ dB			
	60-70	70-75	75-80	>80
Days	Negligible	Slight	Moderate	Significant
Weeks	Slight	Moderate	Significant	Severe
Months	Moderate	Significant	Severe	Severe

Table 5.6.2.6

Significance of Noise Impacts at Nearest Noise Sensitive Locations to the proposed works.

Noise Sensitive Location	Significance of Predicted Noise Impact
Seapoint Court	Significant to Severe
Ravenwell Road	Significant
The Maltings	Severe
Lower Dargle Road	Moderate
Coburg	Severe
Killarney Glen	Significant
Glenwood	Moderate
Other residential Areas	Negligible to Slight

The significance of noise impacts were assessed using the procedure described in Table 5.6.2.5 Predicted noise impacts are described as “severe” during works adjacent or directly opposite Seapoint Court, the Maltings and residences in the Coburg Estate. “Significant” noise impacts are identified at Ravenswell Road, and Killarney Glen. A “moderate” impact is identified at Lower Dargle Road and Glenwood.

In the event of the culvert being constructed at night-time, a severe noise impact will occur at residences within a distance of approximately 400m of the works. The negative noise impact will be temporary in nature. Night-time works can proceed providing satisfactory mitigation measures are formulated in consultation with effected residents.

5.6.2.4.9 Probability of Noise Impacts

The probability of the predicted noise impacts occurring are high in all cases. However the magnitude of these impacts cannot be fully quantified at this planning stage as the duration of construction will be dependent on the contractor.

5.6.2.5 Mitigation Measures

Noise aspects of the project should be managed in accordance with BS 5228 “Noise Control on Construction and Open Sites”, which should be explicitly stated in project contracts. This will require the contractors to carry out detailed quantitative noise

assessments of each proposed construction activity in advance of the works, and to have appropriate technical and organisational mitigation measures in place at the time of the works.

Mitigation of Piling Noise

During sheet piling within close proximity of sensitive locations the possibility of achieving significant additional noise screening is limited.

Special consideration must be taken when undertaking piling works near sensitive locations with predicted noise levels in excess of 80 dB(A). Consultation should be undertaken with residents to inform them of the duration and timing of the works. A work schedule which will result in least disruption should be formulated.

If there are any especially sensitive residents, such as the elderly or people convalescing, the option of providing alternative accommodation for the duration of high-noise works should be made available.

Mitigation of Construction Noise

The NRA guideline construction noise limits are considered appropriate limits for this project. The contractors will be responsible for implementing the appropriate mitigation measures, based on their detailed quantitative assessment of noise emissions from each work activity.

General guidelines for limiting the disturbance, which may be applicable to this development are outlined below:

- Limit noisy construction works to 08.00 to 18.00 weekdays with Saturday working from 08.00 – 13.00 hours

(relatively quiet construction activities could be carried out outside these hours, subject to strict controls)

- Ensure the residents at the nearest sensitive locations are informed in advance of high noise works
- Ensure piling rigs/rock-breaking equipment and any similar high-noise activities are adequately screened from the adjacent sensitive locations, by means of suitable noise screens (e.g. timber hoardings)
- Use modern, silenced and well-maintained equipment conforming to EU directives
- Shut down equipment when not in use, where practicable.
- Site semi-static equipment such as generators, mixers, and compressors as far away as possible from sensitive locations and ensure that the orientation is the optimum for low noise.
- Ensure that workers are given training with respect to minimising noise and disturbance.

Mitigation of Vibration Impact

Continuous vibration monitoring should be undertaken when piling and rockbreaking within 20m of houses. In the event of the 2.5mm/s criterion being exceeded the intensity of the works should be reduced, or work methods modified. This should ensure that 2.5mm/s criterion is not exceeded for an extended period.

5.6.2.6 Residual Impact

By implementing the appropriate noise screening mitigation measures outlined, the predicted noise may be reduced by approximately 6 dB(A). The residual daytime noise impact during sheetpiling is predicted to be “significant” at residences in The Maltings and Coburg, “moderate” at Seapoint Court and Killarney Glen and “slight” at Glenwood and Lower Dargle Road.

The residual impact during the night-time construction of the Culvert at Bray Bridge would be severe at the nearby residences at Ravenswell Road, Lower Dargle Road and the Maltings.

By implementing the vibration mitigation measures in 5.6.2.5 the residual vibration impact is deemed to be slight.

The residual impacts of all other proposed works are deemed to be negligible.

5.6.2.7 The Do Nothing Scenario

There will be neither a positive or negative impact on noise and vibration under the do-nothing scenario.

5.6.2.8 The Worst Case Scenario

The potential noise and vibration impacts have been considered based on a worst scenario.

5.6.2.9 Positive Impact

There are no positive noise impacts associated with the proposed scheme.

5.6.2.10 Reinstatement

Not applicable. There will be no noise reinstatement required.

5.6.2.11 Monitoring

Noise and vibration monitoring should be carried out during the project. Noise monitoring should be carried out at sufficient intervals and locations to ensure that there is reliable data for management of the project in accordance with BS5228 procedures. There should be continuous ground vibration monitoring at houses adjacent to high-vibration activities, such as piling.

5.6.2.12 Summary

A noise and vibration impact assessment of the proposed Bray Flood Defence Scheme has been carried out.

Baseline noise surveys found that the existing noise environment is determined by noise from local and distant traffic. The existing total noise levels in the area are in the range 48 to 61 dB(A) L_{Aeq} . The existing background noise levels are in the range 42 to 48 dB(A) L_{A90} .

At this stage of the planning process it is not possible to state with certainty the duration of the works. However in most cases it is likely that the noise and vibration impacts will be of limited duration in the order of days or a small number of weeks. The noise impacts will only occur during the construction phase of the scheme.

During the construction phase, significant noise levels will be generated during excavation, rockbreaking and sheet piling. When works are in progress adjacent to houses, noise will exceed the 70 dB(A) National Roads Authority daytime construction noise criterion for short periods.

It is proposed to undertake the construction of the culvert at Bray Bridge at night-time. This would result in a severe noise impact at all residences within a distance of approximately 500m from the proposed culvert. Where possible, night-time construction work should be avoided.

Noise aspects of the project should be managed in accordance with BS 5228 “Noise Control on Construction and Open Sites”, which should be explicitly stated in project contracts. This will require the contractors to carry out detailed quantitative noise assessments of each proposed construction activity in advance of the works, and to have appropriate technical and organisational mitigation measures in place at the time of the works. Special consideration must be given to residents of houses adjacent to piling works. Consultation should be undertaken with these residents to inform them of the duration and timing of the works and to formulate a work schedule which will result in least disruption. Special consideration should be given to the elderly, or people convalescing, or other identified special sensitivities.

Allowing for implementation of standard technical and organisational mitigation measures, the residual noise impact during sheetpiling is predicted to be “significant” at residences in The Maltings and Coburg, “moderate” at Seapoint Court and Killarney Glen, and “slight” at Glenwood and Lower Dargle Road.

The residual impacts of all other proposed works are deemed to be negligible.

The generation and transmission of piling vibration will depend on ground conditions encountered, and the exact method of piling. From data presented in BS 5228 however it is considered that the ground vibration levels can be maintained within the accepted limits for prevention of cosmetic damage, and minimal nuisance, through use of low-vibration techniques. However the continuous vibration piling criterion of 2.5mm/s could potentially be exceeded for houses immediately adjacent to the site works, leading to a significant vibration nuisance.

For locations in excess of 20m from the works, it could reasonably be expected that ground vibration could be maintained below the 2.5mm/s criterion. The vibration may still be perceptible, but in terms of nuisance would be tolerable. In such situations, the perceived noise nuisance would in general be greater than the associated vibration nuisance.